CANADA COMMUNICABLE DISEASE REPORT

CCDR

40 years! (1975-2015)

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Inside this issue: Good news on HIV

HIV rates are dropping in Canada, recent evidence on early HIV treatment has informed new global recommendations by the World Health Organization (WHO), and the UNAIDS, the Joint United Nations Programme on HIV/AIDS has challenged the world with an ambitious treatment target to help end the AIDS epidemic. In Canada, at the local/regional, provincial/territorial and federal levels, an assessment of the implications of these developments is currently underway. This issue provides a snapshot of these developments and more. See the summary surveillance report with the latest HIV rates in Canada, read about the new information gleaned over the last few years on barriers and facilitators to HIV testing, and consider the case for addressing the social and structural drivers of undiagnosed and undertreated HIV.

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www.unaids.org/sites/default/files/media_asset/90-90-90_en_0.pdf

World Health Organization (WHO). **Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV.** Geneva: September 2015.
www.who.int/hiv/pub/guidelines/earlyrelease-arv/en/

Upcoming conference

July 17-22, 2016: 21st International AIDS Conference. Durban, South Africa.
www.aids2016.org

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Canada Communicable Disease Report

The *Canada Communicable Disease Report* (CCDR) is a bilingual, peer-reviewed, open-access online scientific journal published by the Public Health Agency of Canada (PHAC). It provides timely, authoritative and practical information on infectious diseases to clinicians, public health professionals, and policy-makers to inform policy, program development and practice.

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Public Health Agency of Canada
130 Colonnade Road
Address Locator 6503B
Ottawa, Ontario K1A 0K9
Email: ccdr-rmtc@phac-aspc.gc.ca

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Surveillance

HIV in Canada: 2009 to 2014

Tomas K[1]*, Dhami P[1], Houston C[1], Ogunnaike-Cooke S[1], Rank C[1]

[1]Public Health Agency of Canada, Ottawa, ON

*Correspondence: kristina.tomas@phac-aspc.gc.ca

Abstract

Background: Between 1996 and 2008, the number of newly reported HIV cases in Canada fluctuated between approximately 2,100 and 2,700 cases per year.

Objective: To describe the recent trends in new diagnoses of HIV in Canada between 2009 and 2014 by age group, sex, exposure category, race/ethnicity, and region, as well as the number of perinatally HIV-exposed infants.

Methods: HIV data were compiled from two databases. The National HIV/AIDS Surveillance System is a passive surveillance system that gathers non-nominal data on a voluntary basis from all the provinces and territories of all cases that meet the national case definition, and includes data on age group, sex, race/ethnicity, country of birth, and exposure categories. The Canadian Perinatal HIV Surveillance Program is a sentinel-based surveillance system; non-nominal data is obtained through a national confidential survey completed by participating physicians.

Results: Since 2009 the number of new HIV cases has slowly but steadily declined from 2,391 cases in 2009 to 2,044 in 2014, which is the lowest number of annual HIV cases seen in the last two decades. The largest proportion (32%) of new HIV cases continues to be diagnosed among those 30 to 39 years of age, but the proportion of cases diagnosed among those 50 years of age or over has increased from 15% in 2009 to slightly over 20% in 2014. Approximately 75% of newly diagnosed cases are males and 25% females. In males, the most common exposure category (60%) was men who have sex with men. In females, the most common exposure category (66%) was heterosexual contact followed by injection drug use (27%). Race/ethnicity varied by sex. In males, over 50% were White, 14% were Aboriginal and 13% Black. In females, 35% were Black, 35% were Aboriginal and 22% were White. There were regional variations in HIV rates across Canada. Between 2009 and 2014, the number of perinatally HIV-exposed infants varied between 200 and 249 but the percentage of perinatal treatment increased from 87% in 2009 to 97% in 2014.

Conclusion: The annual number of reported HIV cases in Canada has been declining in recent years. The proportion of HIV-positive mothers receiving treatment has increased and the number of confirmed HIV-infected infants has decreased.

Introduction

According to the World Health Organization, there are 36.9 million people worldwide living with HIV and 2.0 million people were newly infected with HIV in 2014 (1). HIV remains a public health concern both in Canada and internationally. One of the key programmatic responses in Canada and globally is the timely diagnosis of people with HIV, which benefits individuals with HIV (where early care and appropriate treatment can result in prolonged and improved quality of life) and the overall population (since people

who know their HIV-positive status are more likely to adopt strategies to reduce the possibility of onward transmission of the virus). Timely diagnosis is a key focus of the newly released UNAIDS 90—90—90 targets which aim for 90% of all people living with HIV to know their HIV status by the year 2020 (2).

National reporting of HIV cases began in 1985. Between 1996 and 2008, the number of newly reported HIV cases in Canada fluctuated between approximately 2,100 to 2,700 cases per year; however, the number of people living with HIV was much higher. According to the Public Health Agency of Canada (the Agency), there were approximately 75,500 people living with HIV (including AIDS) in Canada at the end of 2014 (3). Since new HIV treatments have reduced HIV mortality and new infections continue to occur at a rate greater than the number of deaths among people living with HIV, the overall number of Canadians living with HIV infection will likely continue to increase in the years to come.

This article provides a brief overview of the epidemiology of newly reported cases of HIV in Canada between 2009 and 2014 and summarizes recent trends by geographic location, sex, age group, exposure category, and race/ethnicity. The data presented here are based on *HIV/AIDS in Canada: Surveillance Report to December 31, 2014* (4). The HIV/AIDS Surveillance Report series is published annually and provides an overview of HIV and AIDS case surveillance data in Canada from a national perspective.

Methods

Data collection

HIV data are compiled at the national level in Canada using four data sources: the National HIV/AIDS Surveillance System (Public Health Agency of Canada); the Canadian Perinatal HIV Surveillance Program (Canadian Pediatric AIDS Research Group); immigration medical exam data from Citizenship and Immigration Canada and Vital Statistics data from Statistics Canada. For the purpose of this summary we will focus on the first two.

National HIV/AIDS Surveillance System

The National HIV/AIDS Surveillance System (HASS) is a passive case-based surveillance system that collates data voluntarily submitted to the Agency on an annual basis from all provincial and territorial public health authorities.

HIV is a nationally notifiable disease which means that this condition has been prioritized for national level monitoring. This system is voluntary, with cases reported through provincial or territorial departments of health. Provinces and territories have their own legislation for the reporting of priority infectious diseases within their jurisdictions; in 2015, all provinces and territories now include mandatory reporting of HIV (with some variation in specific case definition requirements).

Although HIV reporting requirements and practices differ across the country (5), cases reported to the Agency must meet the national case definition which requires laboratory evidence of HIV infection through a confirmed, repeatedly reactive screening test for HIV antibody in a person over 15 months of age or for cases with history of non-maternal-fetal HIV transmission. See textbox below for the national HIV case definition.

National HIV case definition (6)
Adults, adolescents and children ≥18 months of age:
Detection of HIV antibody with confirmation (e.g., enzyme immunoassay (EIA) screening with confirmation by Western blot or other confirmatory test) OR detection of HIV nucleic acid (e.g., DNA polymerase chain reaction (PCR) or plasma RNA) OR HIV p24 antigen with confirmation by neutralization assay OR isolation of HIV in culture
Children <18 months of age (on two separate samples collected at different times):
Detection of HIV nucleic acid (e.g., DNA PCR or plasma RNA) OR HIV p24 antigen with confirmation by neutralization assay OR isolation of HIV in culture

The HIV surveillance database consists of non-nominal data on people diagnosed with HIV infection including, but not limited to age group, sex, race/ethnicity, country of birth, and risks associated with the transmission of HIV that are organized into exposure categories (see textbox on exposure categories below).

Determination of exposure category for HIV
HIV and AIDS cases are assigned to a single exposure category according to a hierarchy of risk factors. If more than one risk factor is reported, a case is classified according to the exposure category listed first (or highest) in the hierarchy. For example, people who inject drugs may also be at risk of HIV infection through heterosexual sexual activity. However, injection drug use (IDU) is accepted as the higher risk activity with greater likelihood of transmission of HIV. The hierarchy is as follows: • Perinatal transmission • MSM-IDU (men who have sex with men and inject drugs) • MSM (men who have sex with men) • IDU (injection drug use) • Recipient of blood/blood products • Heterosexual contact (origin from an HIV-endemic country; sexual contact with a person at risk; or no identified risk/heterosexual) • Occupational exposure • Other • No identified risk

Standardized data recoding procedures were applied to all submitted provincial and territorial datasets to create a national dataset for analysis.

Canadian Perinatal HIV Surveillance Program

National data on the HIV status of infants exposed perinatally to HIV infection are collected through the Canadian Perinatal HIV Surveillance Program (CPHSP), an initiative of the Canadian Pediatric AIDS Research Group (CPARG). Support for the CPHSP is provided by the Canadian HIV Trials Network (CTN) and the Surveillance and Epidemiology Division within the Agency.

The CPHSP is a sentinel-based surveillance system that collects data on all identified infants and children in Canada born to mothers who are known to be infected with HIV (7). The CPHSP includes infants identified as exposed to HIV during pregnancy, older infants and children not identified in the perinatal period, and those born outside Canada who are receiving care for HIV infection. Data were obtained through a national, non-nominal, confidential survey of infants known to participating pediatricians in tertiary care centres and specialists in HIV clinics across Canada. The HIV status of infants is reported as "confirmed infected", "confirmed not infected", or "infection status not confirmed", according to the United States Centers for Disease Control and Prevention (CDC) surveillance case definitions for HIV infection (8). Tests for HIV deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) (polymerase chain reaction) are used to confirm infection status by four months of age. Infants are classified as "not

confirmed" if they have not yet received the required number of tests to determine their HIV status. The current status of confirmed infected infants is defined as "asymptomatic," "symptomatic," "died of AIDS," "died of a cause other than AIDS" or "lost to follow-up."

Analysis

We calculated the descriptive statistics from HASS and CPHSP for the years 2009 to 2014. The HASS data were stratified by: reporting province or territory, age group, sex, exposure category, and race/ethnicity. The CPHSP data presented are stratified by: year of infant birth, use of antiretroviral therapy (ART), infection status, race/ethnicity, and maternal country of birth.

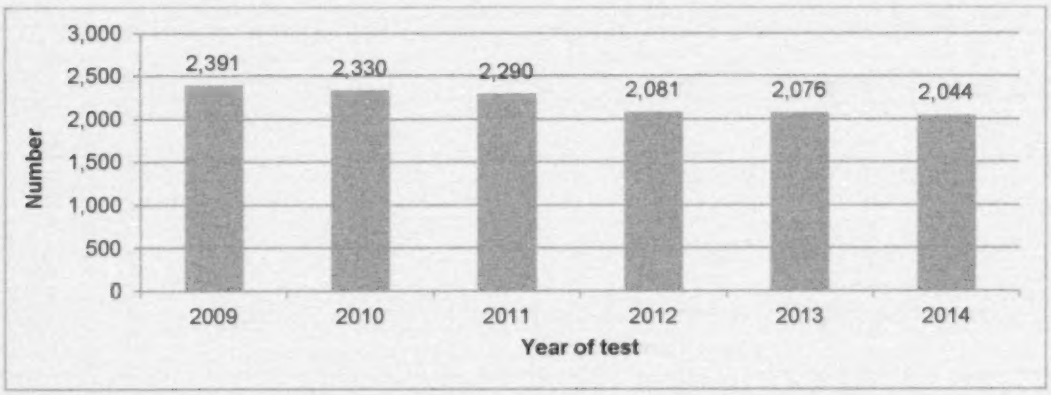
The number and proportion of cases shown in this article reflect data received as part of routine HIV surveillance reporting; no statistical techniques were applied to account for missing data. Data in tables with small cell sizes (n≤5) were reviewed for possible issues regarding data quality and case identification. Strategies such as data suppression or collapsing data categories were used if deemed necessary by national analysts or by provincial or territorial data providers.

Results

HIV trends in Canada, over time

The number of reported HIV cases has steadily decreased each year since 2009; there were 2,044 cases reported in 2014, down 1.7% from the 2,076 cases reported in 2013 and is the lowest annual number seen in the last two decades **(Figure 1)**.

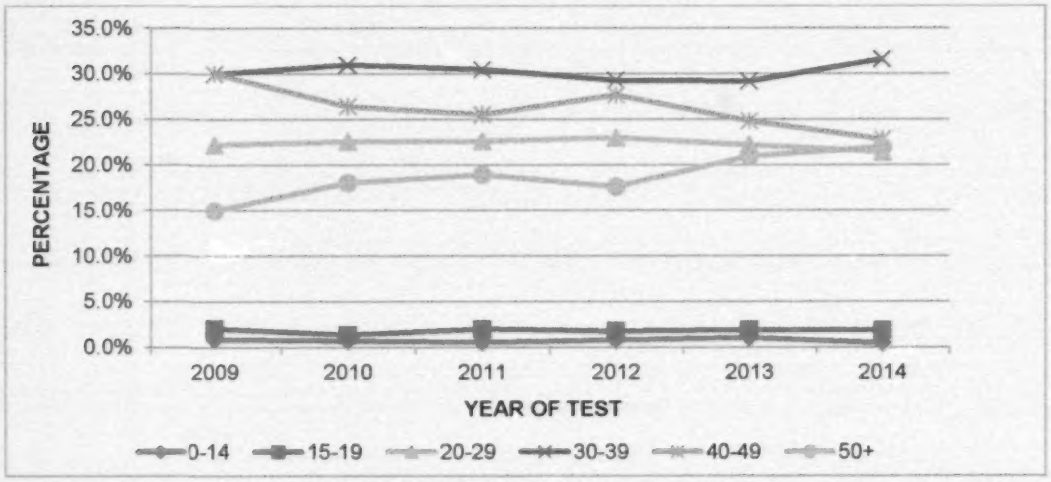
Figure 1: Number of reported HIV cases by year of test, Canada, 2009–2014



Age and sex distribution

The largest proportion of HIV cases are diagnosed among those aged 30 to 39, accounting for approximately one third of cases each year, followed by those aged 40 to 49. In recent years, the proportion of cases diagnosed at 50 years of age or over has increased; in 2014, this age group exceeded the proportion of reported cases of those aged 20 to 29 (**Figure 2**). It should be noted that these data reflect age at diagnosis, not necessarily age at infection.

Figure 2: Percentage of reported HIV cases by age group and year of test, Canada, 2009–2014



The majority of reported HIV cases have always been among males; in the 1990s over 90% of annual HIV cases were male. From 2009 to 2014, the annual proportion of reported HIV cases that were female remained stable at approximately one quarter (range: 21.8%–25.8%).

In general, there have been male–female differences in age at diagnosis—HIV was diagnosed at younger age groups (≤15, 15–19 and 20–29 years of age) among females compared to males, where a greater proportion of HIV cases were diagnosed at older age groups (30–39, 40–49 and 50+ years of age).

Exposure category

Trends in exposure category have shifted since HIV reporting began. In the early stages of the epidemic, more than 80% of all reported HIV cases with a known exposure category were attributed to the "men who have sex with men" (MSM) exposure category. Although this exposure category is still predominant in Canada, the proportion has decreased over the years.

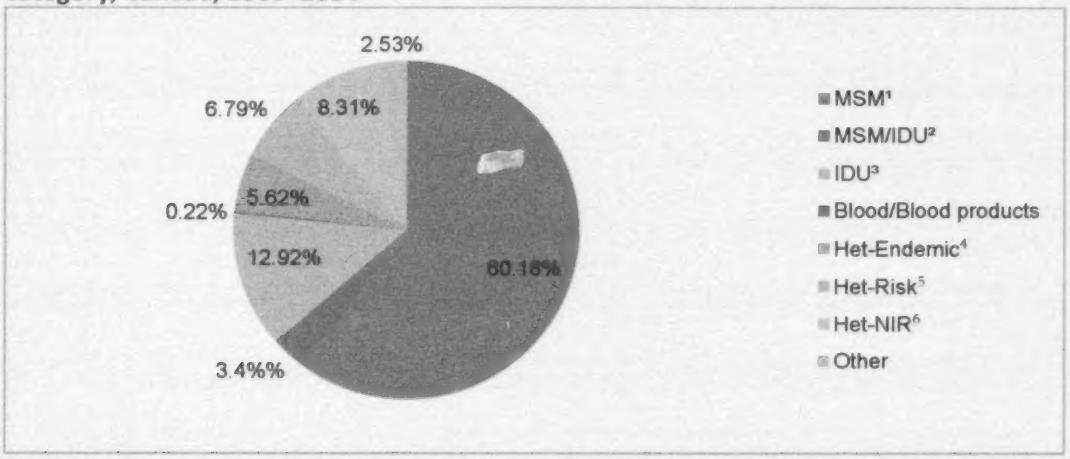
From 2009 to 2014, among cases where the exposure category was known (67.0%), 45.9% of all reported HIV cases in adults (≥15 years of age) were attributed to the MSM exposure category. The second most reported exposure category among adults was heterosexual contact (31.5%), with a near even distribution of HIV cases attributed to heterosexual contact among people born in a country where HIV is endemic (Het-Endemic, 10.7%), heterosexual contact with a person at risk (Het-Risk, 10.5%), and heterosexual contact with no identified risk (Het-NIR, 10.3%). The third most frequently reported exposure category among adults between 2009 and 2014 was injection drug use (IDU), accounting for 16.3% of reported HIV cases.

Exposure category and sex

The distribution of HIV cases among adult males and females (≥15 years of age) differs with respect to exposure category. For 2009 to 2014, the MSM exposure category accounted for the greatest proportion (60.2%) of reported HIV cases among adult males, whereas heterosexual contact (including the Het-Endemic, Het-Risk and Het-NIR groups) accounted for 66.2% of cases among adult females (**Figure 3** and **Figure 4**). With respect to heterosexual contact, there was a substantial difference between males and females in the Het-Endemic exposure category, which accounted for 27.0% of heterosexual contact cases among females compared to 5.6% among males.

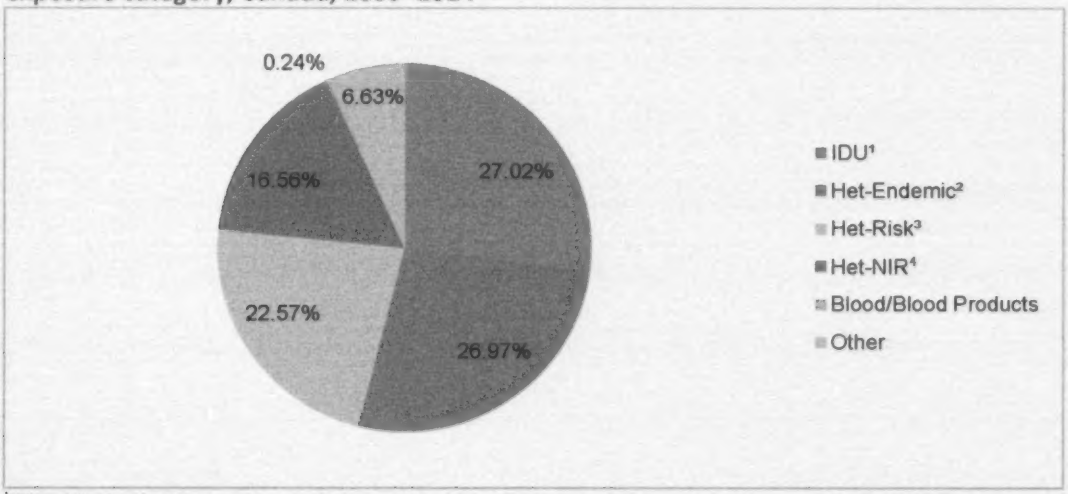
The IDU exposure category accounted for approximately one quarter of adult female HIV cases (27.0%), compared to up to 16.3% of adult male HIV cases (12.9% via IDU exposure and up to 3.4% in the MSM/IDU category).

Figure 3: Proportion of reported HIV cases among adult males (≥15 years of age) by exposure category, Canada, 2009–2014



[1]MSM—men who have sex with men
[2]MSM/IDU—men who have sex with men and use injection drugs
[3]IDU—injection drug use
[4]Het-Endemic—origin from an HIV-endemic country
[5]Het-Risk—sexual contact with a person at risk
[6]Het-NIR—heterosexual contact with no identified risk

Figure 4: Proportion of reported HIV cases among adult females (≥15 years of age) by exposure category, Canada, 2009–2014



[1]IDU—injection drug use
[2]Het-Endemic—origin from an HIV-endemic country
[3]Het-Risk—sexual contact with a person at risk.
[4]Het-NIR—heterosexual contact with no identified risk

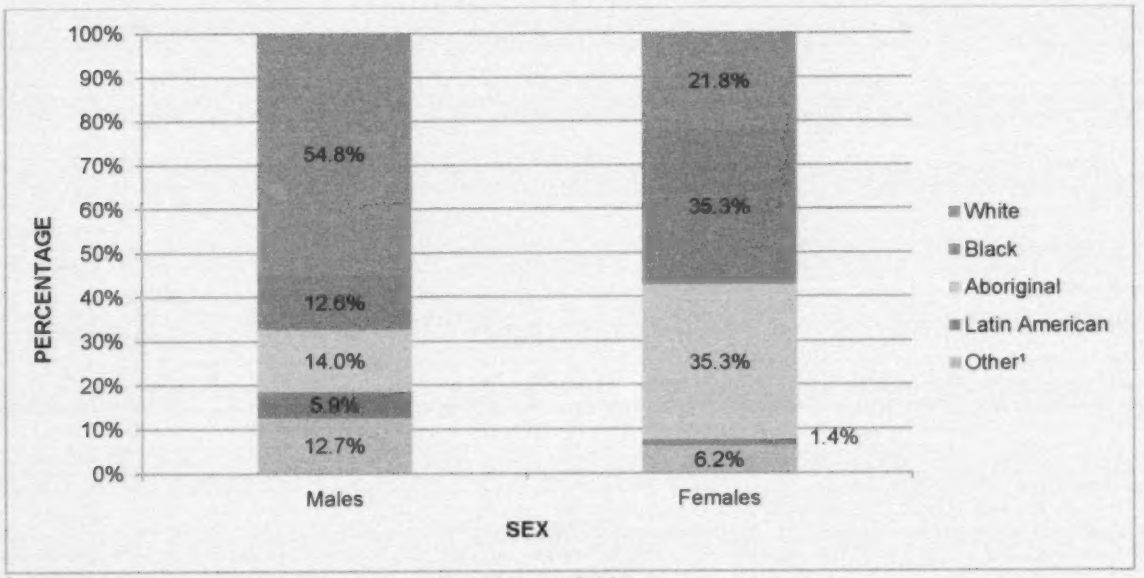
Race/ethnicity distribution

For HIV cases reported from 2009 to 2014, information on race/ethnicity was available for nearly two thirds (59.8%). While this is an improvement from the years prior to 2009, national trends presented in this article must be interpreted with caution given that a substantial number of HIV cases are not included in the race/ethnicity analysis. These data may not be fully representative of the national picture because race/ethnicity data for HIV cases from jurisdictions with more diverse populations are not included.

From 2009 to 2014, nearly one half of reported HIV cases were identified as White (46.8%), followed by Aboriginal (19.2%) and Black (18.1%). The breakdown of the Aboriginal group is as follows: 14.3% First Nations, 1.5% Métis, 3.3% Aboriginal-unspecified, and 0.0% Inuit.

The race/ethnicity distribution varies by sex: for 2009 to 2014, among males, the majority of cases were White (54.8%), followed by Aboriginal (14.0%) and Black (12.6%) (**Figure 5**). By comparison, among females, there were equal proportions of Black (35.3%) and Aboriginal (35.3%), followed by White (21.8%).

Figure 5: Proportion of reported HIV cases (all ages) by sex and race/ethnicity, Canada, 2009–2014



¹"Other" includes Asian, South Asian, West Asian, Arab and other race/ethnicity.

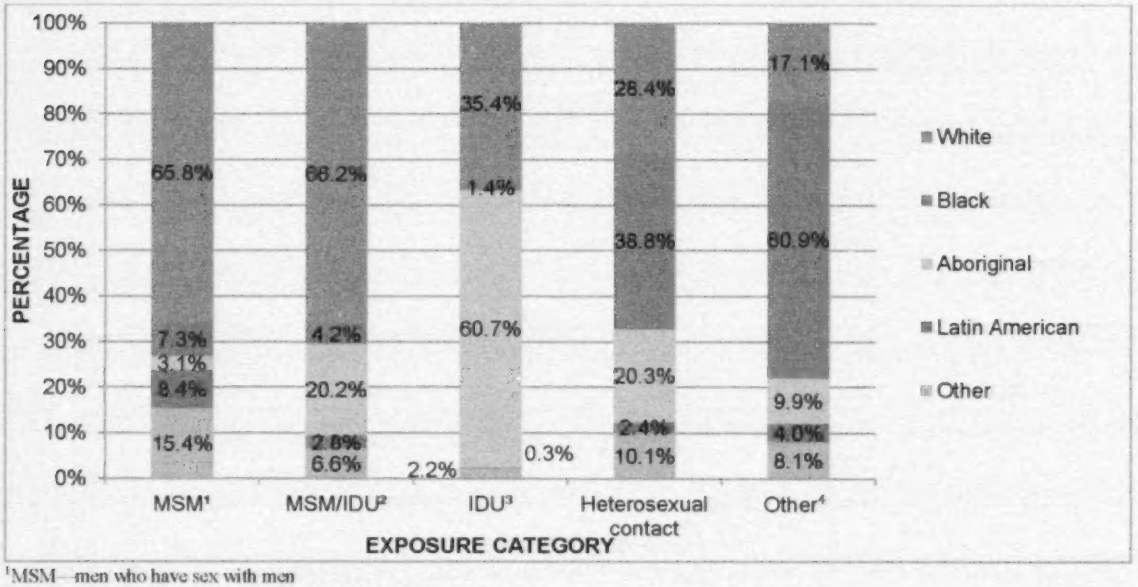
Race/ethnicity and exposure category

Information on both race/ethnicity and exposure category was available for 58.3% of reported cases from 2009 to 2014. Given that a substantial number of HIV cases were not reported with both of these data elements, this section is likely not representative of the overall distribution by exposure category and race/ethnicity in Canada.

Among HIV cases attributed to the MSM exposure category, the majority (65.8%) were identified as White (**Figure 6**). Almost all HIV cases attributed to IDU exposure were either Aboriginal (60.7%) or

White (35.4%). Among cases attributed to the Het-Endemic category (one of the exposure categories falling under heterosexual contact), 82.9% were identified as Black.

Figure 6: Proportion of reported HIV cases (all ages) by exposure category and race/ethnicity, Canada, 2009–2014



[1]MSM—men who have sex with men
[2]MSM/IDU—men who have sex with men and use injection drugs
[3]IDU—injection drug use
[4]"Other" includes Asian, South Asian, West Asian, Arab and other race/ethnicity.

Geographic distribution

The national rate (all ages) of HIV diagnosis in Canada in 2014 was 5.8 per 100,000 population. The highest rate (per 100,000 population) was in Saskatchewan (10.8), followed by Yukon (8.2), Alberta (6.7), Manitoba (6.6) and Ontario (6.1). In Saskatchewan, the all-age HIV diagnosis rate reached a high of 19.2 per 100,000 population in 2009, with annual decreases thereafter. The remaining provinces and territories all reported HIV diagnosis rates below the national rate (ranging from 0.0 in Nunavut to 5.7 per 100,000 in British Columbia). **Table 1** provides the number of reported cases and HIV diagnosis rate by province and territory for the years 2009 to 2014.

Table 1: Number and HIV diagnosis rate (per 100,000 population), Canada and the provinces/territories, 2009–2014

Year of diagnosis	Number/ Rate	Canada	[1]BC	[2]YT	[3]AB	[4]NT	[5]NU	[6]SK	[7]MB	[8]ON	[9]QC	[10]NB	[11]NS	[12]PE	[13]NL
2009	Number	2,391	337	<5[14]	219	<5	0	199	103	996	512	<5	13	0	6
	Rate	7.1	7.6	--	6.0	--	0.0	19.2	8.5	7.7	6.5	--	1.4	0.0	1.2
2010	Number	2,330	300	<5	204	0	0	174	121	1,025	476	8	15	<5	<5
	Rate	6.9	6.7	--	5.5	0.0	0.0	16.5	9.9	7.8	6.0	1.1	1.6	--	--
2011	Number	2,290	288	<5	224	<5	0	188	77	1,003	477	10	15	<5	<5
	Rate	6.7	6.4	--	5.9	--	0.0	17.6	6.2	7.6	6.0	1.3	1.6	--	--
2012	Number	2,081	237	<5	242	<5	0	184	71	869	443	<5	18	<5	9
	Rate	6.0	5.2	--	6.2	--	0.0	16.9	5.7	6.5	5.5	--	1.9	--	1.7
2013	Number	2,076	267	<5	261	<5	0	129	118	815	453	5	16	<5	7
	Rate	5.9	5.8	--	6.5	--	0.0	11.7	9.3	6.0	5.6	0.7	1.7	--	1.3
2014	Number	2,044	262	<5	276	<5	0	121	85	837	435	<5	10	<5	10
	Rate	5.8	5.7	--	6.7	--	0.0	10.8	6.6	6.1	5.3	--	1.1	--	1.9

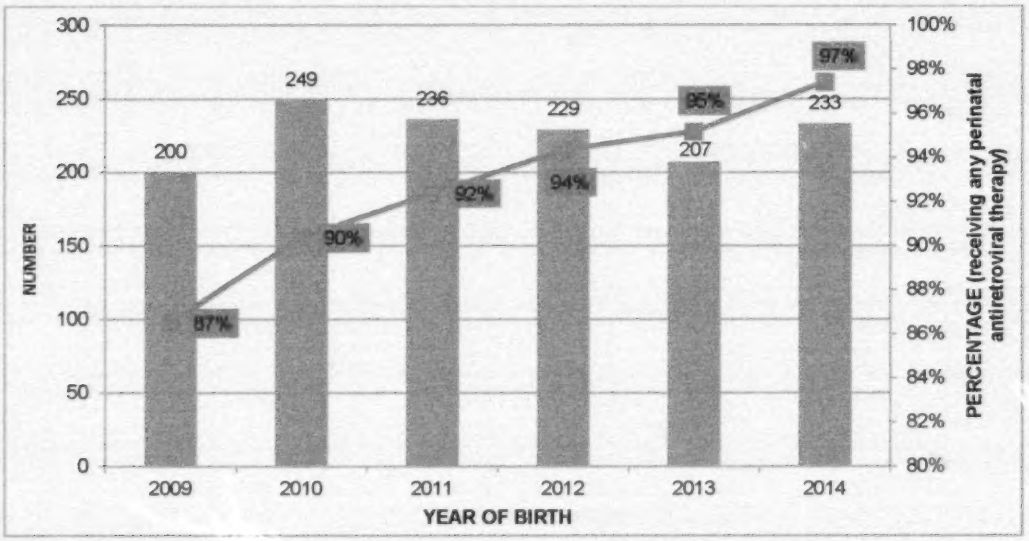
[1]BC—British Columbia; [2]YT—Yukon Territory; [3]AB—Alberta; [4]NT—Northwest Territories; [5]NU—Nunavut; [6]SK—Saskatchewan; [7]MB—Manitoba; [8]ON—Ontario; [9]QC—Quebec; [10]NB—New Brunswick; [11]NS—Nova Scotia; [12]PEI—Prince Edward Island; [13]NL—Newfoundland and Labrador; [14]No rate is provided for numbers less than 5.

Mother-to-child transmission (perinatal transmission)

Each year between 2009 and 2014 the number of infants perinatally exposed to HIV in Canada fluctuated between 200 and 249 cases per year. In 2014, 233 infants were reported as being perinatally exposed, up 14.8% from the 207 reported in 2013 (**Figure 7**).

The proportion of HIV-positive mothers receiving antiretroviral therapy (ART) increased over time to 97.4% in 2014 (**Figure 7**). Correspondingly, the number of infants born in Canada and confirmed to be HIV infected has decreased over the past five years. In 2009, there were eight confirmed HIV-infected cases (4.0%) and in 2014 there were only two (0.4%).

Figure 7: Number of perinatally HIV-exposed infants and proportion of perinatally HIV exposed infants receiving perinatal antiretroviral therapy by year of birth, Canada, 2009-2014



A review of all perinatally exposed infants from 2009 to 2014 shows that the majority (77.4%) were born to mothers who acquired HIV infection through heterosexual contact, whereas nearly one fifth (18.3%) were attributed to IDU exposure. With respect to race/ethnicity distribution of the infants, over half (54.1%) were reported as Black, one fifth (19.6%) as Aboriginal, and almost one fifth (18.5%) as White. Maternal region of birth for the majority of infants was Africa (44.8%), North America (39.3%), or the Caribbean (6.6%).

Discussion

The annual number of newly reported cases of HIV has been declining in Canada. In 2014, the number of new HIV cases reported to the Agency was the lowest reported in the last two decades; the rate is now 5.8 per 100,000 population. The MSM exposure category remains the predominant HIV exposure category in Canada overall, followed by heterosexual contact and IDU exposure, with some variation by sex, province/territory and race/ethnicity. There were distinct differences observed between males and females with respect to age at HIV diagnosis. HIV diagnosis tended to be at a younger age among females compared to males. Also, the proportion of HIV cases diagnosed among Canadians 50 years of age and older has increased gradually. Although the number of perinatally exposed infants increased slightly in 2014, the proportion of HIV-positive mothers receiving treatment has also increased and there were only two confirmed HIV-infected infants in Canada.

The national HIV surveillance system data have several limitations. There are variations in reporting practices across jurisdictions, reporting delays, under-reporting, duplicate reports, as well as missing or incomplete data. The completeness of epidemiologic information collected and submitted to the Agency varies by jurisdiction. In particular, exposure category and race/ethnicity information is incomplete for many case reports. Most significantly, Quebec does not submit exposure category or race/ethnicity information for HIV cases to the Agency; however, the province does publish provincial reports that include information on exposure category and race/ethnicity. In Ontario, completeness of exposure category and race/ethnicity data for HIV cases has changed over time. Completeness increased

significantly for data from 2009 onwards due to the inclusion of supplementary data collected through the Ontario Laboratory Enhancement Program. Manitoba does not provide disaggregated data on Aboriginal populations. The perinatal surveillance data collected by CPHSP is sentinel-based; therefore, possible referral bias exists, as the main referral centres from each geographic area are used for data collection (7).

It is important to note that our data tend to understate the magnitude of the HIV epidemic. Surveillance data do not represent the total number of people infected with HIV (prevalence) or the number of people newly infected each year (incidence). Surveillance data can tell us only about people who have been diagnosed with HIV. Furthermore, because HIV is a chronic infection with a long latency period, many individuals who are newly infected in a given year may not receive a diagnosis until much later. As well there may be individual or societal behaviour changes over time that contribute to changes in observed disease trends, such as changes in HIV testing patterns (e.g., who comes forward for testing and when).

Awareness of HIV status remains a big issue. At the end of 2014, an estimated 21% of the 75,500 individuals living with HIV in Canada were unaware of their infection. These people are hidden from the health care and disease monitoring systems, and thus cannot take advantage of appropriate prevention, care and treatment services until they are tested and diagnosed. Knowledge of HIV-positive status is also important to prevent vertical transmission.

In Canada, ongoing HIV transmission remains a concern. Since new HIV treatments have reduced HIV mortality and new infections continue to occur, the overall number of Canadians living with HIV infection will likely continue to increase in the years to come. So, although we have documented declining rates of new cases this does not mean the need for HIV care will decrease. And continued efforts are needed to reach the undiagnosed cases of HIV to decrease transmission (9).

Finally, given the variation in number of HIV case reports, as well as differences in the demographic profile of cases (i.e., race/ethnicity, age and sex) across provinces and territories, the data presented in this article highlights the need for population-specific interventions.

The national HIV surveillance data collected by the Agency continue to inform such work as: the estimates of HIV prevalence and incidence in Canada; the development and assessment of the HIV care cascade; the development and assessment of national public health guidance and recommendations (e.g., HIV testing guidelines); federal, provincial and territorial policy and program development to prevent and control HIV and AIDS; the development and dissemination of credible, evidence-based knowledge and public health guidance to support health professionals; and the development of targeted intervention strategies at local, provincial and national levels.

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Conflict of interest

None

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Review

An overview of recent evidence on barriers and facilitators to HIV testing

Traversy GP[1], Austin T[1], Ha S[1], Timmerman K[1]*, G[illegible]e-Rowe M[1]

[1]Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada, Ottawa, ON

*Correspondence: karen.timmerman@phac-aspc.gc.ca

Abstract

Background: To address the issue of undiagnosed HIV infections, the Public Health Agency of Canada released the *Human Immunodeficiency Virus—HIV Screening and Testing Guide* in 2012, which identified several barriers and facilitators for HIV testing.

Objective: The objective of this overview is to summarize the most recent evidence regarding barriers and facilitators to HIV testing, to expand upon the research conducted for the *HIV Screening and Testing Guide*.

Methods: A review of the literature published between 2010 and 2014 was conducted using Scopus, PubMed (MEDLINE), and the Cochrane Library; websites of groups such as the Centers for Disease Control and Prevention, European Centre for Disease Prevention and Control, Australian Department of Health, and New Zealand Ministry of Health were searched for recent reports. Studies were categorized based on the barrier or facilitator identified, and the results were summarized.

Results: In addition to the known barriers of lack of perceived risk, lack of comfort or knowledge, provider time constraints, and fear of the diagnosis, stigma and discrimination, new studies have identified additional barriers including: fear regarding disclosure or lack of confidentiality, lack of access, lack of compensation of providers, and lack of human resources to carry out testing. In addition to the known facilitators of increased awareness and normalization of HIV screening and testing, opt-out testing was identified as a facilitator in recent studies.

Conclusion: Since 2010, research has advanced our knowledge of barriers and facilitators and can be applied to help decrease the number of undiagnosed HIV infections.

Introduction

Human immunodeficiency virus (HIV) infection is now largely considered a manageable condition due to advances in treatment. Without appropriate interventions, however, HIV can progress to acquired immune deficiency syndrome (AIDS), which can lead to illness and death. Reducing the spread of HIV in Canada requires concerted efforts at widespread screening and testing to identify individuals who may miss opportunities to obtain treatment, and thus unknowingly be transmitting the virus to others. Providing early HIV diagnosis is important in preserving quality of life for those who are infected, and reducing the number of undiagnosed cases of HIV will help to prevent transmission of the virus (1).

In Canada, approximately 75,500 individuals were living with HIV at the end of 2014 and an estimated 21% of those were unaware of their infection (2). To complement existing initiatives to reduce the number of undiagnosed HIV cases in Canada, the Public Health Agency of Canada (the Agency) released the *Human Immunodeficiency Virus—HIV Screening and Testing Guide* (the Guide) in 2012 to support health

care providers with normalizing HIV testing (1). Within the Guide, several barriers and facilitators to HIV screening and testing were identified, specifically: lack of perceived risk for HIV infection among patients and providers; comfort and knowledge with respect to HIV testing among patients and providers; providers' time constraints; cumbersome consent procedures; and managing fears of stigma or discrimination associated with testing and risk behaviours in general (1).

The studies used to inform the Guide were published prior to 2010 (1). As the implementation and normalization of routine HIV screening and testing remain an important issue for public health in Canada, a broad overview of more recent studies on the barriers and facilitators of HIV testing was warranted. We chose to do an overview of the literature because the inconsistent definition of barriers and facilitators across studies as well as the overlap between barriers and facilitators limited the ability to perform a systematic review.

The objective of this overview was to summarize the most recent evidence regarding barriers and facilitators of HIV screening and testing in Canada, and similar developed countries in order to help identify gaps in knowledge, and potentially inform future revisions to the Guide.

Methods

A literature review was conducted using databases such as Scopus, PubMed (MEDLINE), and the Cochrane Library. Search terms included "HIV" or "human immunodeficiency virus" and "screening" or "testing" and "barriers" or "facilitators" or "predictors." Other literature sources searched for relevant reports included the websites of the Centers for Disease Control and Prevention (CDC), the European Centre for Disease Prevention and Control (ECDC), the Australian Department of Health, and the New Zealand Ministry of Health. Studies and reports from Canada, the United States, Europe, Australia, and New Zealand, published between 2010 and 2014, were included in the literature review; editorials, commentaries and letters to the editor were excluded. The key barriers and facilitators identified in each of the studies were reviewed and categorized, and evidence tables were developed to summarize and organize the key findings. The organization of study results into barrier and facilitator categories was confirmed by two of the authors of this article—S. Ha and T. Austin. Barriers and facilitators are described in **Table 1**.

Table 1: Description of barriers and facilitators

Barriers	Definition
Lack of perceived risk of HIV infection	**For patients:** the patient does not believe he/she has a risk of acquiring HIV, or believes that his/her behaviours prevent risk. **For providers:** the provider does not believe his/her patients have a risk of acquiring HIV, or assumes they are at low risk, and may also believe that HIV is not an issue for his/her patient population or region of practice.
Comfort discussing and lack of knowledge of HIV	**For patients:** the patient does not feel comfortable discussing HIV or other sexual issues with the provider, and may have a general lack of knowledge about HIV, or how and where to get tested. **For providers:** the provider feels discomfort or anxiety in asking sexual questions to the patient, or in eliciting patient fears regarding HIV. He/she may lack knowledge of consent procedures, how to manage positive results and reporting procedures for their jurisdiction, and may feel that a lack of specific training prevents them from testing for HIV.
Health care provider time constraints	Health care providers have a lack of time for HIV testing and associated counselling, or have competing priorities during a visit that prevent them from testing for HIV.

Fear, stigma and discrimination	The patient fears a positive result, social repercussions for seeking testing or for testing positive (discrimination, rejection), being unable to cope with results, or that he/she will see someone he/she knows at the clinic.
Access to testing	A lack of ability to access testing in general (due to remote/rural location, lack of insurance [U.S. studies], testing location hours of operation, language barriers), or an inability to access a variety of testing services that are typically available (e.g., lack of anonymous testing in rural locations vs. metropolitan locations) acts as a barrier to testing.
Financial and human resource constraints	Cases where providers may not perform HIV testing due to a lack of compensation, or there is an inability to run HIV testing initiatives due to lack of staff.
Facilitators	**Definition**
Normalizing HIV testing	Reducing the negative stigma surrounding HIV by making it a routine test (similar to checking cholesterol, for instance). Offering testing as part of regular care.
Opt-out testing	HIV testing is offered and administered unless the patient specifically refuses.
Increasing knowledge and awareness	Using patient-centred educational material to make patients more knowledgeable, more likely to see HIV testing as a positive thing, and improve interest in testing. Using provider-centred materials to enhance training around HIV testing, and improve provider-patient communication.

Results

Overall 34 studies and reports on barriers and facilitators to HIV testing were identified. The majority of these were American, while a smaller number were from European countries and Australia. One report and one study were from Canada; no literature was found from New Zealand.

Barriers

Lack of perceived risk of HIV infection

An important barrier to HIV testing is the perceived lack of risk that stems from the inability to accurately assess levels of risk, either for one's self (on the part of patients or clients) or for patients (on the part of health care providers), which has the potential to act as a barrier. In a systematic review of European studies by Deblonde et al., low risk perception was identified as a barrier in four (out of 24) of the studies analyzed (3). In a survey of 629 Europeans recently diagnosed with HIV, 73% of respondents indicated that low risk perception was a reason for not having previously been tested (4). A survey of 519 HIV-negative men in Australia found that 41.2% of respondents cited believing they had not engaged in risky behaviour as a reason for delaying or avoiding testing (5). Similarly, several American interview-based studies have looked at barriers to initial testing in patients with HIV/AIDS, or factors that contributed to late diagnosis of HIV in individuals who developed AIDS within 12 months of HIV diagnosis (6–8).

Low risk perception is a recurring theme among these studies (6–8). One of these studies, from San Francisco, found that low risk perception was mentioned by 14 out of 41 interviewees, and another from New York found that 89 of 139 interviewees cited low risk perception (7,8). Health care providers from North Carolina interviewed by White et al. also identified low risk perception as a patient barrier towards routine testing (9). In addition, interviews with primary care providers, infectious disease specialists and internal medicine residents have suggested that patients' perceived lack of risk poses a challenge for testing (10,11). Therefore, patients who perceive themselves as low risk for HIV infection are less likely to seek HIV testing.

In contrast, inappropriate assessment of risk by health care providers themselves may also act as a barrier. Among health care providers, results from surveys and interviews have found inaccurate or low risk perception to be a common barrier to HIV testing. In a survey of 221 health care providers in Washington, 57% agreed that perceiving the patient as low risk is a barrier to testing (12). Open-ended interviews with 24 health care providers in Mississippi and Rhode Island also identified incorrect assumptions of patients' risks as a barrier (13). In a survey of HIV testing coordinators, program directors, nurse managers and laboratory directors from hospitals, community-based organizations and clinics/health centres in Washington, DC, and Houston, Texas, a frequently selected barrier was that HIV was not an issue for the patient population (68.6% in Washington, 20.9% in Houston) (14). Similarly, in a survey of 515 clinical educators from the Society of General Internal Medicine in the U.S., reasons behind whether or not trainees were encouraged to perform routine HIV testing were investigated. The most common reason for not encouraging trainees to perform routine HIV testing was a perception of low local prevalence (15).

Lack of knowledge and discomfort

Lack of knowledge is an important barrier for patients and it influences other barriers. A U.S. survey of 443 adults in nine academic internal medicine clinics found that significant predictors of self-reported HIV testing were a patient's knowledge about HIV (odds ratio [OR]=1.3), as well as patient request for testing (OR=103.3) (16). As a result, the authors suggest that "simple waiting room prompts (to ask for HIV testing) and public education campaigns may represent the most efficient interventions to increase HIV testing rates" (16). Lack of knowledge may also be a factor in terms of where to go for testing; this was described as a barrier in the systematic review by Deblonde et al. (3). Patient discomfort or refusal of testing was also cited as a barrier in one American study (14).

Several barriers to routine HIV testing related to health care providers' knowledge and comfort level have been identified. In studies from the U.S., lack of familiarity with local regulations regarding HIV testing procedures and disagreements with national recommendations were considered barriers to HIV testing (15,17,18). A barrier resulting from a systematic review was provider anxiety about offering HIV testing in a primary care setting (3). Similarly, interviews with health care providers in Mississippi, Rhode Island and Massachusetts identified discomfort in initiating conversations about HIV testing as a barrier (13,19). Other studies in the United States and Europe suggest that fears about how to deal with positive results, as well as feelings of inexperience or lack of training with respect to procedures and regulations, may act as a barrier for health care providers (11,13,17,18,20,21).

Health care provider time constraints

Time constraints and competing priorities during patient visits are commonly experienced by health care providers. Time constraints can arise due to lengthy consent procedures (depending on local regulations) as well as lengthy pre- and post-test counselling procedures (9,12,15,17,18,20,22,24). Health care providers may perceive time constraints as a barrier due to the lack of familiarity of local regulations (e.g., if they are unaware that testing requires only verbal consent, they may perceive the procedures required to obtain consent as being more time consuming than they actually are).

Fear, stigma and discrimination

When patients are fearful of positive results, they may be less likely to request an HIV test (3,5,25). Thus, fear of the test itself or of potential positive results may act as a barrier, in addition to fears of being discriminated against or stigmatized. In recent literature, fear of stigma or discrimination from the community have emerged as barriers to HIV testing and may deter a patient from seeking HIV testing in the first place (25–27). In particular, this may be evident in small communities where the patient may be likely to encounter individuals he/she knows during the testing process (23). Patient fear of social repercussions due to a positive test is a very commonly mentioned barrier, both by patients and health care providers (4,7,9,11,22,26,28,29).

Patient fear regarding the possibility of disclosure or a lack of confidentiality is another barrier to HIV testing (3,4,27). Youth may have particular reason to fear disclosure due to staff being unaware of testing confidentiality practices. In a study examining barriers to youth HIV testing in New York, of 131 HIV testing site representatives that were interviewed using a "secret shopper" approach, 14% either gave incorrect information, or did not know, when asked whether parents could find out the youth's test result (30). Fears with respect to anonymity likely also reflect fears regarding the stigma associated with testing and the potential discrimination from family or community members. Health care providers interviewed in one study suggested that assurances of confidentiality for the patients were of great importance as a facilitator (13). Patient fears related to stigma, consequences of positive results and confidentiality could also potentially stem from a lack of knowledge (e.g., a patient may not realize that they can live a long healthy life with current HIV treatments, in the case of a positive test), highlighting the overlap that can exist among barriers.

Access to testing

People living in rural or remote areas may not be able to access a variety of HIV testing services as easily as people living in denser metropolitan areas. Providers in Mississippi, for example, suggested that the need to travel long distances for testing services was a barrier for patients in their jurisdiction (11). In a separate U.S. study of individuals who received late diagnoses of HIV, living in a rural area was more commonly associated with late diagnoses than living in an urban area (31). Similarly, an Australian study found that having a practice in a metropolitan area was associated with more HIV testing than having a practice in a non-metropolitan area (OR=1.40) (32).

In a Canadian review of barriers faced by women with respect to HIV testing, the author stressed that anonymous testing may not be universally available (26). Among adolescents receiving rapid HIV testing in an emergency department (n=114), 80% of those surveyed stated they would be more likely to get a test if a rapid version was available (33). In the study by Hyden et al., in which 131 HIV testing site representatives in New York were interviewed, only 12% of the sites provided testing outside the hours of 08:30 to 17:00, Monday to Friday (30). Similarly, 23% of the sites exclusively offered testing on weekdays between 09:00 and 15:00. Thus, the operating hours of testing sites could represent a significant barrier to youth who are in school, as well as those who are unable to take time off work during the week. In a survey of Australian HIV-negative men, 15.2% of participants cited difficulty getting an appointment as a reason for delaying testing (5). Health care providers have also identified that language barriers may also act as a barrier to accessing HIV testing (12,18,34).

Financial and human resource constraints

Health care providers frequently mentioned lack of resources or compensation as personal and institutional barriers. Having financial and physical resources, as well as being able to employ enough staff to run routine HIV testing initiatives within hospitals and community clinics, emerged as a barrier within American and European studies (3,13,14,18,20). Health care providers have also cited a lack of compensation for the extra time spent on HIV testing and its related procedures as a barrier (9,11,22,23). Due to the lack of recent Canadian studies in this area, it is not entirely clear whether these issues would emerge as barriers in Canada.

A summary of recent studies on barriers to HIV testing is presented in **Appendix 1**.

Facilitators

Normalizing HIV testing

The Agency, the CDC and the ECDC recommend normalizing HIV testing by including it as part of routine care (1,22,35). Including HIV testing as a component of periodic routine medical care is a multi-faceted approach in the sense that normalized testing not only reduces the stigma associated with HIV, but also encourages more patients to be receptive to the idea of testing, and to be tested (1,10,16,29,33). Several sources have highlighted that patients are more likely to be tested for HIV if they are offered a test as

opposed to requesting the test themselves (16,29,33). According to Haines et al., 67% of surveyed adolescents stated that they would be more likely to participate in testing if it were offered, as opposed to having to request it (33).

Normalized testing has been linked to reduced stigma among patients who are tested for HIV. In a survey of Scottish men who have sex with men (MSM), individuals who had been tested in the past year had less fear of positive results, and a greater testing norm than those who had been tested more than one year ago, or had never been tested (36). Other studies suggest that "HIV should be no different than screening for glucose levels, cholesterol levels, or blood pressure" (17).

Opt-out testing

With opt-out testing, HIV testing is offered and administered, unless explicitly refused by the patient. Opt-out testing has been identified as a potential facilitator for HIV testing as it eliminates the requirement for lengthy consent procedures, removing this barrier for health care providers and patients. In this sense it addresses the issue of a lack of time, as well as concerns regarding any lack of reimbursement for extra time spent. Although opt-out testing could be effective in increasing testing rates (3), it is important that patients have the capacity to consent and understand the implications of an HIV test. Some provinces and territories in Canada have already adopted an opt-out strategy to prenatal HIV screening (26).

Increasing knowledge and awareness

Increasing the availability of HIV-related knowledge translation material to improve awareness could be useful to highlight the benefits of testing. When patients are educated about the benefits of testing and are educated with respect to HIV (for instance, regarding the effectiveness of antiretroviral therapies and methods for reducing transmission risk), they are more likely to be tested (34). Adam et al. found that greater HIV knowledge was associated with better testing routines among MSM (37). Studies examining the predictors of HIV testing suggest that individuals are more likely to seek testing if they foresee positive outcomes (e.g., protecting family, peace of mind) as opposed to negative ones (e.g., stigma) (29,37). Studies examining facilitators or factors associated with recent HIV testing suggest that increasing patient and health care provider knowledge using HIV literature and HIV-specific training is a potential facilitator (13,17,23). Health care providers found that patient interest and willingness, as well as knowledge of local consent and counselling regulations were facilitators to testing (13,23).

Not surprisingly, health care providers suggest improvement in HIV-specific training for providers, increased availability of HIV literature for providers and patients, patient education initiatives, and improvements in provider communication as possible facilitators of routine HIV testing (13,17,23). The Guide recommends "[streamlining] the provision of pre-test information using print, video, mobile and web-based resources" (1).

A summary of recent studies of facilitators of HIV testing is presented in **Appendix 2**.

Discussion

Our overview of the recent literature confirmed the ongoing importance of all the barriers that were identified in the *HIV Screening and Testing Guide*: lack of perceived risk, lack of comfort or knowledge, provider time constraints, and fear, stigma, and discrimination. Additional barriers identified in this review include fears regarding disclosure or a lack of confidentiality, lack of access, lack of compensation for providers, and the lack of human resources to carry out testing initiatives.

In terms of facilitators, while the Guide does recommend the normalization of HIV screening and testing, and touches upon the topic of increasing awareness (e.g., by emphasizing HIV as a chronic manageable condition), little is mentioned regarding opt-out testing as a potential facilitator (1). Opt-out testing was

identified as a facilitator in this overview, as it addresses some key barriers. Although it is currently used in some parts of Canada as part of prenatal screening, it is unclear whether opt-out testing for the general population will result in significant improvements in identifying HIV-positive individuals.

A strength of the current overview is that it provides a brief snapshot of what has been learned about barriers and facilitators of HIV screening and testing since the creation of the Guide in 2012. A limitation of this overview is that it only included studies from high-income countries. This may limit global generalizability of the results, but they remain relevant for Canada. Also, there was no systematic assessment of bias performed for the included studies. This overview, however, is intended to provide a snapshot of the evidence, as opposed to grading the quality of that evidence.

This study has identified a number of areas for future work. First, these findings could be used to inform future iterations of the Guide, and could be used by other organizations to inform programming. Second, while it is important to identify and be aware of important barriers, more research could be performed to review and evaluate interventions aimed at addressing these barriers (e.g., knowledge translation products, campaigns, etc.). Third, HIV testing strategies such as couples testing and self-testing were not identified as facilitators in the current review. Future research could consider the merits of these strategies. Finally, overall there was a lack of Canadian studies; thus, studies to confirm the relevance of the above-mentioned barriers and facilitators in the Canadian context would be useful.

Conclusion

Understanding the major barriers and facilitators to HIV testing is essential to increase the number of individuals being tested for HIV as it can inform effective strategies to decrease the 21% of those infected who are unaware of their HIV status (2). Targeted interventions could address the barriers and capitalize on the facilitators.

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Appendix 1: Summary of studies on barriers to HIV testing

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Lorenc et al., (2011) (25)	England	What is the qualitative evidence related to views and attitudes of MSM concerning HIV testing?	Systematic review	Men who have sex with men (MSM)	Barriers include: • Fear of consequences of positive test • Perception of stigma from other gay men or from wider culture
Deblonde et al. (2010) (3)	11 countries in Europe, the Middle East and Russia	What are barriers to HIV testing?	Systematic review	Various	For patients: • Fear (of positive result, inability to cope with results, stigma) • Low risk perception among certain patients • Worries related to confidentiality • Lack of knowledge of where to receive testing For providers: • Anxiety over asking about HIV testing • Lack of training • Reluctance to offer testing • Lack of resources • Lack of universal policies
CDC (2013) (22)	United States	Examine trends in testing among different groups—discusses barriers in "commentary" section.	Review	Several	For patients: • Fear/concerns about stigma or discrimination based on test results • Costs of tests For providers: • Perception that risk-based testing is more effective than routine testing • Concerns regarding reimbursement for testing • Lengthy informed consent and pre-test counselling process • Not being certified to provide HIV counselling • HIV testing not available in the provider's institution
DeMarco et al. (2012) (28)	United States	Barriers to following CDC recommendation of routine HIV testing	Review	Various	For patients: • Fears related to stigma, being discriminated against, or judged for getting tested • Lack of perceived risk • Lack of easy access • Concerns about confidentiality/anonymity For providers: • Lack of time to implement/carry out routine testing procedures • Perceived low risk in the community • Uncertainties about ability to properly counsel patients

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Wertheimer (2011) (26)	Canada	What are the barriers that women face when it comes to HIV testing/ screening?	Review	Women	For patients: • Fear of judgment from community or health care provider • Fear of lack of confidentiality or that they will see people they know at clinic • Access (e.g., anonymous testing not available in all provinces) For providers: • Assumption that patient is low risk
Yazdanpanah et al. (2010) (34)	24 countries in Europe and Russia	Barriers to earlier testing: Why do patients present late? How to overcome barriers?	Review	Several studies with variety of populations	For patients: • Denial of risk factors • Lack of knowledge regarding care options for HIV-positive individuals • Fear of consequences of positive test (mainly worries related to discrimination and rejection) For providers: • Consent process and pre-test counselling requirements • Competing priorities • Language challenges
Deblonde et al. (2014) (4)	Belgium, Estonia, Finland, Portugal	What are reasons for HIV testing, or reasons for not having been tested prior to HIV diagnosis?	Survey	Recently diagnosed HIV-positive patients (72% male)	Reasons for not testing: • Low risk perception most frequently cited (73% of participants) • Not feeling ill • Fear of HIV disease • Fear of stigma and discrimination • Fear of breach of confidentiality • Practical and financial barriers
Hallmark et al. (2014) (14)	United States	To what extent do you agree with a number of possible barriers using a five-point scale?	Survey	HIV testing coordinators, program directors, nurse managers, and/or lab directors, in various settings	Highest rated/frequently selected: • Lack of funding for testing • Patient discomfort/refusal • HIV is not a problem for the client population • Limited staff time to provide testing • Limited staff size to provide testing
Iqbal, DeSouza & Yudin (2014) (27)	Canada	Willingness to accept testing (yes/no) and attitudes towards HIV testing in labour. What are differences between those who accept and those who don't?	Survey	HIV-negative expectant mothers presenting at hospital in labour	Top reasons for not accepting: • Don't want to know • Too much labour pain • Fear of pain from testing • Fear of breach of confidentiality • Fear of partner's family or community's reaction

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Prestage, Brown & Keen (2012) (5)	Australia	What are reasons for delaying or avoiding HIV testing?	Survey	HIV-negative men	Commonly selected barriers: • I haven't done anything risky (41.2%) • Having to return another time for results (40.3%) • I haven't enough time (25.4%) • I haven't changed partners (19.8%) • I haven't had any illness or symptoms that made me worry (19.5%) • It's difficult to get an appointment (15.2%) • I'm afraid I might be told I have HIV (14.1%)
Arbelaez et al. (2012) (24)	United States	What are barriers to implementing routine HIV testing in emergency department?	Survey	Health care providers in emergency department	Most frequently cited barriers: • Lack of time (61%) • Lack of resources (60%) • Concerns about follow-up (59%)
Shirreffs et al. (2012) (12)	United States	Agree/disagree with commonly reported barriers?	Survey	Health care providers	• Patient is low risk (57%) • Extra time spent on counselling (31%) • Consent procedures (22%) • Legal issues (20%) • Language barrier (19%) • Other concerns with respect to time (17%) • Concerns about getting reimbursed (13%)
Berkenblit et al. (2012) (15)	United States	Do you encourage their trainees to perform routine HIV testing (yes/no)? If not, what are the reasons (select from several options)?	Survey	Clinical educators from the Society of General Internal Medicine	Reasons for not encouraging routine testing: • Perception of low local prevalence • More important teaching issues • Clinic environment too busy • Lack of familiarity with recommendations • Disagreement with recommendations
Korthius et al. (2011) (23)	United States	Agree/disagree with commonly reported barriers?	Survey	Internal medicine specialists	• Competing priorities during visit (79%) • Time (64%) • Patient reluctance (64%) • Consent requirements (49%)
Mimiaga et al. (2011) (20)	United States	What are barriers to the implementation of routine HIV testing at the site?	Survey	Senior administrators, medical directors and health care providers from community health centres	• Constraints on providers' time (68%) • Time required to administer counselling (65%) or to obtain informed consent (52%) • Lack of funding to support implementation (35%) • Need for additional training (34%) • Staff availability (33%) • Informed consent statutes/regulations (27%) • Educating health care providers about statutory/ regulatory requirements (25%)

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Glasman et al. (2010) (29)	United States	What factors influence individuals' intentions to seek/accept HIV testing?	Survey	Heterosexual men of Mexican decent	Less likely to seek testing if: • Negative outcomes are expected, such as stigma, fatalism (OR=0.40)
Bogart et al. (2010) (18)	United States	What are barriers to providing rapid HIV testing?	Survey	Laboratory and department staff from hospitals Staff from community clinics and community-based organizations	For labs: • Difficulty in learning procedures, state/ federal regulations • Staff not sufficiently trained • Not enough staff • Possibility of false positives For hospital departments: • Too many state/federal regulations • Difficult to integrate counselling with other services • Difficult to fit counselling into one session • Not enough staff • Difficulty explaining rapid test to patients with poor language abilities For clinics/community-based organizations: • Lack of resources/space to implement rapid testing program • Not enough staff • Regulations difficult to understand • Staff unsure how to link patients to care when tests are positive
White et al. (2014) (9)	United States	What are perceptions of barriers and facilitators to implementing routine HIV testing according to primary care physicians?	Interview	Primary care physicians	For patients: • Low HIV risk perception • Fear of stigma • HIV test refusal For providers: • HIV/AIDS stigma • Socially conservative communities • Lack of confidentiality • Rural geography • Time constraints and competing clinical priorities • Lack of universal reimbursement
Schwartz, Block & Schafer (2014) (6)	United States	What are factors that led to, or are associated with, late diagnosis?	Interview	Individuals who received a late diagnosis of HIV (defined as having developed AIDS within 12 months of HIV diagnosis)	Recurrent themes in interviews: • Lack of perception of risk for HIV • Missed opportunities for testing while receiving care for illness • Lack of offer from physician due to patients not fitting traditional risk category or because they did not disclose their risk factors • Testing recommended but not pursued either due to financial reasons (e.g., no insurance) or due to fear of results
Brennan et al. (2013) (10)	United States	What are barriers and facilitators to adoption of universal HIV screening in a low-prevalence setting?	Interview	Internal medicine residents	Physicians perceived discussions about HIV testing as challenging due to: • Stigma surrounding HIV • Patient perception of low risk

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Sison et al. (2013) (11)	United States	What are physicians' attitudes and practices regarding HIV testing and linkage to care?	Interview	Primary care physicians and infectious disease specialists	For patients: • Fear of stigma • Lack of HIV care providers • Long distance to travel for treatment/care services For providers: • Lack of reimbursement • Lack of knowledge regarding state laws on consent • Perception that patients perceive themselves as low risk • Routine testing not offered by most providers
Hyden, Allegrante & Cohall (2013) (30)	United States	What potential barriers might adolescents face when seeking HIV testing?	Interview	HIV testing site representatives	• 12% of contacted agencies offered testing outside of 8:30 to 17:00, Monday through Friday • 23% offered testing exclusively between 9:00 and 15:00 on weekdays while most adolescents are in school • 17% were incorrect, unclear, or did not know if a parent's permission was required for a 15-year-old to be tested • 14% answered incorrectly or did not know when asked whether parents could find out an adolescent's test result
Hudson, Heilemann & Rodriguez (2012) (17)	United States	What are primary care providers' perspectives on, and experiences of, facilitators and barriers to offering voluntary HIV counselling and testing to all patients aged 13 to 64 as part of annual screening?	Interview	Primary care providers (defined as family practice, internal medicine or pediatrics)	• Feeling that patients will lose trust, feel stigmatized and coerced into testing • Time constraints with respect to consent and counselling procedures • Fears about ability to deal with positive results • Assumptions about need for testing based on age or marital status
Mills et al. (2011) (8)	United States	What were barriers to an HIV-positive individual's initial test?	Interview	HIV-positive individuals	Commonly selected: • Lack of perception of risk (69%) • Thought their behaviours kept them safe from getting HIV (52%) • No one offered them a test (42%) • Fear of positive test (23%) • Worried about confidentiality (17%) • Afraid they might lose friends or family if someone found out they tested positive (12%)
Johnson et al. (2011) (19)	United States	What are barriers to testing for health care providers?	Interview	Senior staff at community health centres	• Lack of time • Lack of resources (financial and staffing) • Discomfort with subject (asking sexual questions, eliciting patient fear)

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Schwarcz et al. (2011) (7)	United States	What are the factors that led to late testing/diagnosis of HIV?	Interview	Individuals who developed AIDS within 12 months of HIV diagnosis (88.4% male)	• Fear (e.g., of positive result, social repercussions, lack of support) (68%) • Lack of risk perception (34%) • Lack of health care insurance
Simmons et al. (2011) (13)	United States	What are barriers and facilitators of routine HIV testing?	Interview	Health care providers	• Discomfort initiating conversations with patients about HIV • Absence of patient-friendly literature • Incorrect assumptions about patient risk • Lack of HIV-specific training • Rapid pace of primary care office visits • Financial burden of increased HIV testing • Patient fear of test results • Patient concerns about confidentiality • Lack of availability of treatment for positive cases
Myers, Koester & Dufour (2011) (21)	United States	What are barriers to implementing and/or expanding HIV testing? What are strategies to overcome these barriers?	Interview	Program funding and managing administrators, and medical directors/ physicians providing care in clinics	For providers: • Provider inexperience • Perceived patient reluctance to do test • Time requirements for obtaining consent and counselling • Competing priorities during visit • Uncertainty about added value of testing all patients
Trepka et al. (2014) (31)	United States	What are factors associated with late diagnosis in rural and urban dwelling individuals?	Chart review	Individuals who received a late HIV diagnosis (developed AIDS within three months of diagnosis)	Living in rural area more commonly associated with late diagnosis after controlling for age, sex, race/ethnicity, HIV transmission mode, country of birth, and diagnosis year (adjusted OR=1.39)

Appendix 2: Summary of studies on facilitators to HIV testing

Author (year)	Country	Question(s)/ study objective	Method	Population	Key findings/ facilitators identified
Lorenc et al. (2011) (25)	England	What is the qualitative evidence related to views and attitudes of MSM concerning HIV testing?	Systematic review	Men who have Sex with Men (MSM)	Motives for testing include: • Uncertainty of unknown HIV status • Sense of responsibility towards oneself or one's partner
Yazdanpanah et al. (2010) (34)	24 countries in Europe and Russia	Barriers to earlier testing: Why do patients present late? How to overcome barriers?	Review	Several studies with variety of populations	For patients: • Perception of risk • Perception of benefits from testing
Adam et al. (2014) (37)	Australia	What social-cognitive factors are associated with stronger HIV testing routines?	Survey	HIV-negative MSM	Correlates of HIV testing in multivariate analysis: • Age • HIV knowledge • Perceived "pros" of testing • Attitudes regarding HIV testing
Knussen, Flowers & McDaid (2014) (36)	Scotland	Which factors differ between individuals who have tested in the past year, who have tested more than one year ago, and who have never tested for HIV?	Survey	Convenience sample of Scottish MSM	Individuals who reported testing in the past year had: • Less fear of positive results • Greater rated norm of testing And were more likely to have: • At least one anal sex partner during the year (condom used) • Two to ten sexual partners (as opposed to none or one)
Deblonde et al. (2014) (4)	Belgium, Estonia, Finland, Portugal	What are reasons for HIV testing, or reasons for not having been tested prior to HIV diagnosis?	Survey	Recently diagnosed HIV-positive patients	Reasons prompting a test: • Worries about risk exposure • Checking one's status • Feeling ill
Sawlesh-warkar et al. (2011) (32)	Australia	What factors are associated with HIV testing by general practitioners?	Survey	General practitioners	Predictors of HIV testing included: • Management of a "risk factor" (OR=19.4) • Testing as part of screening (OR=10.6) • Younger general practitioner age (under 35 more likely to test than 55+, OR=1.74) • Practice in a metropolitan area (OR=1.4) • Patient age, gender (male > female, OR=3.0) • Patient is new to that practice (OR=2.1) • Being Indigenous (OR=1.7)
Korthius et al. (2011) (23)	United States	Agree/disagree with commonly reported barriers?	Survey	Internal medicine specialists	Commonly selected facilitators: • Increased compensation for HIV counselling (56%) • Having literature to give to patients (53%) • More info on local consent requirements

Author (year)	Country	Question(s)/ study objective	Method	Population	Key findings/ facilitators identified
Haines et al. (2011) (33)	United States	What are adolescents' attitudes and preferences towards emergency department-based HIV testing, future plans for testing, and counselling?	Survey	Convenience sample of adolescents (aged 14 to 21) receiving opt-in rapid HIV testing in an emergency department	• 80% were more likely to get a test if a rapid version was available • 67% were more likely to accept testing if it was offered, rather than having to request it • 40% strongly agreed in regard to the preference for a same-sex counsellor
Glasman et al. (2010) (29)	United States	What factors influence individuals' intentions to seek and/or accept free HIV testing?	Survey	Heterosexual men of Mexican decent	More likely to seek/accept testing if: • They associate testing with positive outcomes (e.g., setting positive example, protecting family, peace of mind) (OR=4.77 for seeking; OR=7.60 for accepting) • They received HIV prevention advice from significant others (OR=2.96 for seeking)
Stefan et al. (2010) (16)	United States	What are the correlates of self-reported HIV testing?	Survey	Adult patients in academic internal medicine clinics	Univariate correlates of HIV testing: • Provider recommendation • Patient request • Knowledge about HIV • Being comfortable with doctor • African American race • Using street drugs • Agreement with CDC recommendations Multivariate regression model predictors of HIV testing: • Patient request for testing (OR=103.3) • Patient knowledge about HIV (OR=1.30)
Brennan et al. (2013) (10)	United States	What are barriers and facilitators to adoption of universal HIV screening in a low-prevalence setting?	Interview	Internal medicine residents	Majority of patients were especially receptive to HIV screening when normalized and when an expert authority was referenced (e.g., CDC)
Sison et al. (2013) (11)	United States	What are physicians' attitudes and practices regarding HIV testing and linkage to care?	Interview	Primary care physicians and infectious disease specialists	For providers: • Nearly all providers explained they would be willing to offer routine testing if they could bill for the service
Hudson, Heilemann & Rodriguez (2012) (17)	United States	What are primary care providers' perspectives on, and experiences of, facilitators and barriers to offering voluntary HIV counselling and testing to all patients aged 13 to as part of annual screening?	Interview	Primary care providers (defined as family practice, internal medicine, or pediatrics)	• Normalizing HIV testing ("HIV should be no different than screening for glucose level, cholesterol level, or blood pressure") • Resources and training to improve provider knowledge and comfort with current guidelines • Patient education on HIV testing • Personal style and communication (e.g., taking time to educate and motivate patients)

Author (year)	Country/ region	Question(s)/ study objective	Method	Population	Key findings/ barriers identified
Simmons et al. (2011) (13)	United States	What are barriers and facilitators of routine HIV testing?	Interview	Health care providers	• Patient interest and willingness • Assurances of confidentiality • Availability of more HIV-specific literature and training in clinics • Providers being more proactive in offering testing
Myers, Koester & Dufour (2011) (21)	United States	What are barriers to implementing and/or expanding HIV testing? What are strategies to overcoming these barriers?	Interview	Program funding and managing administrators, and medical directors/ physicians providing care in clinics	• Lifting of lengthy mandatory consent/counselling requirements • Making routine testing a priority • Correcting assumptions among providers that testing is universally available

Commentary

Tackling the social and structural drivers of HIV in Canada

Rourke SB[1,2,3*], Bacon J[1], McGee F[4], Gilbert M[1,5]

[1]Ontario HIV Treatment Network, University of Toronto, Toronto, ON
[2]Department of Psychiatry, University of Toronto, Toronto, ON
[3]Centre for Research on Inner City Health, Li Ka Shing Knowledge Institute of St. Michael's Hospital, Toronto, ON
[4]AIDS Bureau, Ontario Ministry of Health and Long-Term Care, Toronto, ON
[5]Dalla Lana School of Public Health, University of Toronto, Toronto, ON

*Correspondence: sean.rourke@utoronto.ca

Abstract

There is new hope that we can significantly reduce HIV rates. The United Nations AIDS organization, UNAIDS, has challenged all countries to strive for aggressive targets that could significantly bend the curve on HIV infections and deaths: 90% of people living with HIV diagnosed; 90% of people diagnosed on treatment; and 90% of people on treatment virally suppressed. This new optimism is largely driven by strong research findings that early and ongoing HIV treatment improves individual health outcomes and reduces people's viral load, making them less infectious. However, the risk of HIV infection is far from evenly distributed among populations most at risk. Those most at risk will find it hardest to reach these targets as they are caught in a syndemic (synergistic epidemic) of intertwining health and social issues. Our research, and that of others, shows that those who are in a syndemic of co-occurring mental health, addiction and social issues (e.g. homelessness, food insecurity) are significantly more likely to fall out of care, less likely to adhere to treatment and less likely to achieve/maintain an undetectable viral load. Intervention studies have found that a combination approach to HIV prevention and treatment that goes beyond primary care and mental health tools to include social and structural interventions has a protective effect, and can reduce risk and improve adherence. People living with and at risk of HIV need better access to social and mental health services as well as clinical treatment services that will help them achieve and maintain optimal health and well-being. We strongly encourage those in the HIV sector across the country to identify a common vision, with clear goals and targets. With concerted and targeted efforts, a focus on program and implementation science, and a willingness to see and treat HIV as a social as well as a biomedical problem—the fourth decade of HIV in Canada could well be the last.

The opportunity

In this, the fourth decade of HIV, there is renewed hope and energy. The Joint United Nations Programme on HIV/AIDS (UNAIDS), has challenged all countries to strive for aggressive targets that could significantly bend the curve on HIV infections and deaths: 90% of people living with HIV diagnosed; 90% of people diagnosed on treatment; and 90% of people on treatment virally suppressed (1). Several countries, such as the United States and Australia, individual states and provinces (e.g., British Columbia), and cities (e.g., San Francisco) have launched ambitious treatment-focused strategies to reduce—and even end—new HIV infections.

This optimism is largely driven by strong research findings that early and ongoing HIV treatment improves individual health outcomes and reduces people's viral load, making them less infectious. Recent studies have also demonstrated the ability of pre-exposure prophylaxis (PrEP) to prevent infection in people at high risk of acquiring HIV (2,3).

Effective scale-up of HIV testing and treatment is essential. However, as the Lancet–UNAIDS Commission recently noted: it "... will not be sufficient to control the epidemic" if we do not address the stigma, discrimination, syndemics, and the social and structural drivers of the HIV epidemic (4).

The impact of syndemics

The risk of HIV infection is far from evenly distributed among populations most at risk. It is concentrated among those caught in a syndemic (synergistic epidemic) of intertwining health and social issues. For example, in the Multicenter AIDS Cohort Study (MACS) of 4,295 gay, bisexual and other men who have sex with men (MSM), Mimiaga et al. examined the effect of five psychosocial conditions on HIV incidence: depressive symptoms, heavy alcohol use, stimulant use, polydrug use, and childhood sexual abuse (5). Compared to those with none of these psychosocial health problems, an increasing number of these conditions was highly associated with HIV incidence, with men who had four or five of the conditions having an 8.7-fold increased risk of acquiring HIV over 48 months. Similar Canadian research takes this deeper by describing how social syndemics of marginalization experiences (harassment, career discrimination, physical violence, forced sex, suicidality) fundamentally contribute to the prevalence of similar psychosocial conditions among MSM (6).

In our Ontario HIV Treatment Network (OHTN) Cohort Study, which follows more than 5,000 people living with HIV in Ontario (about a third of all people currently in care), we are encouraged to see that most people *who are part of that in-care cohort* who receive care in specialized HIV clinics are nearing the 90–90–90 targets for being on antiretroviral therapy (ART) and for being virally suppressed (7); however, a different and concerning picture emerges when we examine those in care who have multiple psychosocial syndemic risks. Across all populations, those who experience a syndemic of co-occurring mental health and addiction issues are significantly more likely to fall out of care, less likely to adhere to treatment and less likely to achieve/maintain an undetectable viral load (8). (Note: people with HIV who are not part of this cohort may not be doing as well in terms of the 90–90–90 targets. Ontario is currently analyzing the cascade for the other two thirds of people living with HIV who are in care.) Other provinces are also seeing these complex factors affect health outcomes. The South Alberta HIV Program, for example, has identified high prevalence of domestic and intimate partner violence across all HIV risk groups, including MSM, and has documented its negative effects on engagement in HIV care, mental health and social stability (9,10).

We are also learning about the impact of social determinants on mental health and HIV-related outcomes. According to our housing research in Ontario, funded by the Canadian Institutes of Health Research and the OHTN, people with HIV who are unstably housed are more likely to: have higher viral loads; be non-adherent to HIV treatment; not access medical or social services; have substance use issues; experience higher levels of depression and stress; and have higher mortality rates. In fact, incident depression is 50% higher in people who had difficulty affording housing-related expenses, and 60% higher in those who felt that they did not belong to their neighbourhood. In addition, those who were worried about being forced to move out, were significantly more likely to develop recurrent depression (8,11). These results emphasize that social networks and context matter: when they are not safe, supportive and enabling, they can put individuals at risk of further negative health consequences.

Research in the United States and Canada has identified similar impacts related to food insecurity (12–14). People with HIV who are food insecure are less likely to have undetectable viral loads and have higher morbidity and mortality, and poorer physical and mental health-related quality of life (15). They miss more primary care appointments and make less use of HIV treatment. However, once they receive effective food and nutrition services, the picture changes dramatically: they are less likely to miss appointments, more likely to be on treatment, score higher in terms of mental health, and are more likely to be virally suppressed.

Using program science to tackle social and structural drivers

The impact of syndemics reinforces the importance of a combination approach to HIV prevention and treatment that goes beyond primary care and mental health tools (16) to include protective social and structural interventions that can reduce risk and improve adherence—such as Housing First programs, access to harm reduction programs, effective interventions to reduce violence, and enabling social environments that help eliminate stigma and discrimination and protect human rights. Program science and implementation science offer new ways of thinking about pragmatic ways to mobilize research results and create effective, scalable and sustainable interventions in the real world (17–21). Program science is the "systematic application of theoretical and empirical scientific knowledge to improve the design, implementation and evaluation of public health programs" (19). Implementation science is a "multidisciplinary specialty that seeks generalizable knowledge about the behaviour of stakeholders, organizations, communities and individuals in order to understand the scale of, reasons for, and strategies to close the gap between evidence and routine practice for health in real-world contexts" (17).

There is no doubt that Canada has the knowledge, tools and resources to provide this type of programmatic, combination approach that can bring the HIV epidemic in this country to its knees. In Ontario, our new HIV strategy emphasizes the importance of working collaboratively across stakeholder groups (community, public health and health sectors) to give people living with and at risk of HIV better access to social and mental health services, as well as clinical treatment services that will help them achieve and maintain optimal health and well-being.

Time for combination system-wide approaches

We strongly encourage those in the HIV sector across the country to come together to learn from one another, and to identify a common vision with clear goals and targets—as well as the structures and interventions that will help achieve a cross-sectoral and combination approach—and then, through a focus on program and implementation science, make it happen.

At the clinical level, this means that, in addition to offering testing and treatment, the primary care/family or emergency room physician will routinely ask patients with or at risk of HIV about their housing, food security, experience of violence, mental health and substance use—and make appropriate referrals. At the program level, this means introducing efficacious social and structural interventions, and assessing their impact in different contexts and populations. At the policy level, this means developing policies-such as indicators for social outcomes—that enable the health care system to take effective combination interventions to scale.

Take home message

Biomedical approaches alone will not be enough to end HIV. We must tackle the social and structural drivers. With concerted and targeted efforts, a focus on program and implementation science, and a willingness to see and treat HIV as a social as well as a biomedical problem—the fourth decade of HIV in Canada could well be the last.

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Conflict of interest

None

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ID News: Early antiretroviral treatment: What is the evidence?

The INSIGHT START Study Group. **Initiation of Antiretroviral Therapy in Early Asymptomatic HIV Infection.** N Engl J Med 2015;373:795-807. DOI: 10.1056/NEJMoa1506816

BACKGROUND: Data from randomized trials are lacking on the benefits and risks of initiating antiretroviral therapy in patients with asymptomatic human immunodeficiency virus (HIV) infection who have a CD4+ count of more than 350 cells per cubic millimeter.
METHODS: We randomly assigned HIV-positive adults who had a CD4+ count of more than 500 cells per cubic millimeter to start antiretroviral therapy immediately (immediate-initiation group) or to defer it until the CD4+ count decreased to 350 cells per cubic millimeter or until the development of the acquired immunodeficiency syndrome (AIDS) or another condition that dictated the use of antiretroviral therapy (deferred-initiation group). The primary composite end point was any serious AIDS-related event, serious non–AIDS-related event, or death from any cause.
RESULTS: A total of 4685 patients were followed for a mean of 3.0 years. At study entry, the median HIV viral load was 12,759 copies per milliliter, and the median CD4+ count was 651 cells per cubic millimeter. On May 15, 2015, on the basis of an interim analysis, the data and safety monitoring board determined that the study question had been answered and recommended that patients in the deferred-initiation group be offered antiretroviral therapy. The primary end point occurred in 42 patients in the immediate-initiation group (1.8%; 0.60 events per 100 person years), as compared with 96 patients in the deferred-initiation group (4.1%; 1.38 events per 100 person-years), for a hazard ratio of 0.43 (95% confidence interval [CI], 0.30 to 0.62; P<0.001). Hazard ratios for serious AIDS-related and serious non–AIDS-related events were 0.28 (95% CI, 0.15 to 0.50; P<0.001) and 0.61 (95% CI, 0.38 to 0.97; P = 0.04), respectively. More than two thirds of the primary end points (68%) occurred in patients with a CD4+ count of more than 500 cells per cubic millimeter. The risks of a grade 4 event were similar in the two groups, as were the risks of unscheduled hospital admissions.
CONCLUSIONS: The initiation of antiretroviral therapy in HIV-positive adults with a CD4+ count of more than 500 cells per cubic millimeter provided net benefits over starting such therapy in patients after the CD4+ count had declined to 350 cells per cubic millimeter.

The TEMPRANO ANRS 12136 Study Group. **A Trial of Early Antiretrovirals and Isoniazid Preventive Therapy in Africa**. N Engl J Med 2015;373:808-22. DOI: 10.1056/NEJMoa1507198

BACKGROUND: In sub-Saharan Africa, the burden of human immunodeficiency virus (HIV)–associated tuberculosis is high. We conducted a trial to assess the benefits of early antiretroviral therapy (ART), 6-month isoniazid preventive therapy (IPT), or both among HIV-infected adults with high CD4+ cell counts in Ivory Coast.
METHODS: We included participants who had HIV type 1 infection and a CD4+ count of less than 800 cells per cubic millimeter and who met no criteria for starting ART according to World Health Organization (WHO) guidelines. Participants were randomly assigned to one of four treatment groups: deferred ART (ART initiation according to WHO criteria), deferred ART plus IPT, early ART (immediate ART initiation), or early ART plus IPT. The primary end point was a composite of diseases included in the case definition of the acquired immunodeficiency syndrome (AIDS), non–AIDS-defining cancer, non–AIDS-defining invasive bacterial disease, or death from any cause at 30 months. We used Cox proportional models to compare outcomes between the deferred-ART and early-ART strategies and between the IPT and no-IPT strategies.
RESULTS: A total of 2056 patients were followed for 4757 patient-years. A total of 204 primary end-point events were observed (3.8 events per 100 person-years; 95% confidence interval [CI], 3.3 to 4.4), including 68 in patients with a baseline CD4+ count of at least 500 cells per cubic millimeter (3.2 events per 100 person-years; 95% CI, 2.4 to 4.0). Tuberculosis and invasive bacterial diseases accounted for 42% and 27% of primary end-point events, respectively. The risk of death or severe HIV-related illness was lower with early ART than with deferred ART (adjusted hazard ratio, 0.56; 95% CI, 0.41 to 0.76; adjusted hazard ratio among patients with a baseline CD4+ count of ≥500 cells per cubic millimeter, 0.56; 95% CI, 0.33 to 0.94) and lower with IPT than with no IPT (adjusted hazard ratio, 0.65; 95% CI, 0.48 to 0.88; adjusted hazard ratio among patients with a baseline CD4+ count of ≥500 cells per cubic millimeter, 0.61; 95% CI, 0.36 to 1.01). The 30-month probability of grade 3 or 4 adverse events did not differ significantly among the strategies.
CONCLUSIONS: In this African country, immediate ART and 6 months of IPT independently led to lower rates of severe illness than did deferred ART and no IPT, both overall and among patients with CD4+ counts of at least 500 cells per cubic millimeter.